

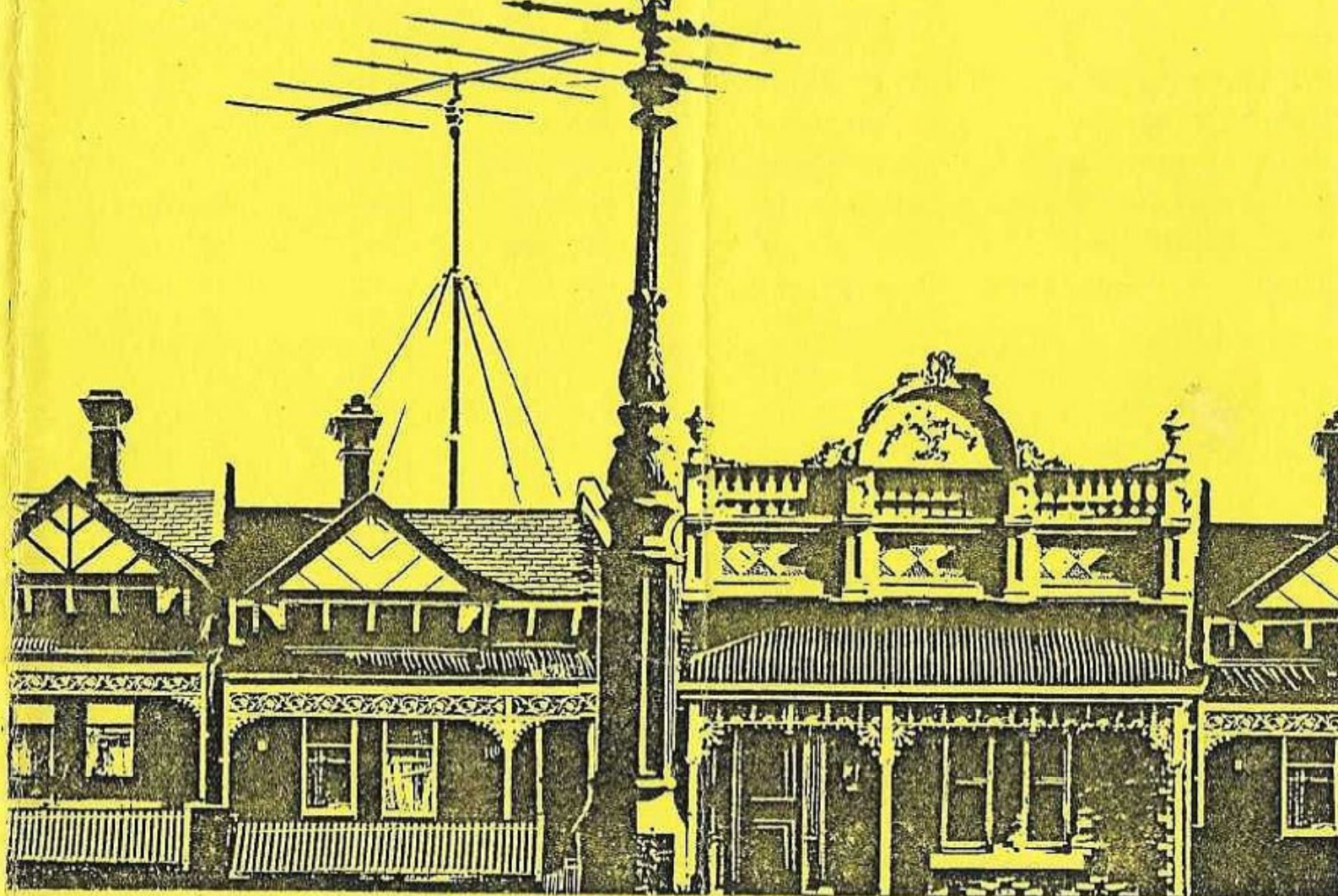
86/05

01



B·A·R·G NEWS

MAY 1986



◉ **Monthly Newsletter of the
Ballarat Amateur Radio Group**

86/5 02

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B.A.R.G. Meets the LAST FRIDAY of every month at the
BALLARAT EDUCATION CENTRE, Hobetoun Street. at 7.30 p.m.
 All Correspondence to P.O. Box 216E Ballarat East. 3350 Vic.

Awards Manager, VK3-XEX, R.S.D. Rokewood Junction. Vic.

MINUTES OF GENERAL MEETING HELD 18th APRIL 1986.

MEETING OPENED at 8.00pm by President Lou DFI who welcomed members and visitors VK3 DXF and Janna.

APOLOGIES. AEX,NLR,NQQ,SE,NIZ,XOA,SE,NIZ.

MINUTES as printed in News Letter confirmed. NFZ/VU.

CORRESPONDENCE IN Details of S.E.R.G.Convention .
Information on "Dennis Reedman Action Fund"

CORRESPONDENCE OUT W.I.A.Wicen Co-ordinator re use of 3.610 for net.
W.I.A. re use of IYP callsign.

TREASURERS REPORT. General a/c \$608.30 VS&L a/c \$1131.01.

QSL MANAGER Cliff PAF reported 142 cards in and 102 out.

NET CO-ORDINATOR Fred KQF thanked all those who have answered his appeal to have more Club participation.

TECHNICAL Dick VU gave a most interesting report on our new repeater RBS which is ready for installation when the licence and written site permission is received,he followed this with a demonstration of the computerised decoder system which will be used in controlling the repeater.

AWARDS MANAGER Maury XEX had applications for 4 Goldrush,4 Western District and 2 DX Widows awards.

LADIES AUXILLIARY.A Progressive Dinner will be held in June.

HAMVENTION.Convener Murray AAI gave a rundown on changes in format to make the Hamvention more interesting and entertaining,i.e. Saturday night a casserole dinner with VK5 AGR talking on Satelite communication.A Satelite station working if possible. A High Speed C.W.Contest 25-40 wpm with cash prize. Rig throwing contest open to both sexes. Members of BARG to billet visiting hams. It was also resolved that the Hamvention be held every two years,this would enable another Western District Club to hold a convention if they desired.

GENERAL BUSINESS.It was decided to make a Club outing by steam train to Ararat.Full details in News Letter.

The Club Constitution is no longer viable having been superseded by the Model Rules set out in the articles of Incorporation.

MEETING CLOSED at 8.50pm and after a short break Ian AXH and Greg DIE proceeded with the testing of members rigs.
Thankyou Ian and Greg.

73s Jim CFB.

B.A.R.G. General meeting at Education Centre Friday May 30th.Junk Sale.
B.A.R.G. Committee meeting at Education Centre Wednesday June 18th.7.30p
WESTERN ZONE AGM at Lake Bolac Hotel Saturday May 31st.1.30pm.

Safe tune-up with the FT7

by LES MAY, G4HHS*

WHEN the author's HW100 was replaced by an FT7 no particular antenna matching problem was envisaged as the half-size G5RV could be matched on 3.5 to 21MHz with the E-Zee Match in use. However, conversations with other operators indicated that the longevity of the transistors in modern solid-state power amplifiers was a matter of some concern; whether they were used operating valve power amplifiers in a poorly matched condition was not clear. What was well known was that the FT7 and TS120V transceivers must be operated with an output vswr of less than 1.5:1.

Provided a suitably tuned matching device is used, this does not present any problem. The procedure normally adopted with the FT7 is to tune-up to a dummy load, and then to replace the dummy load with the E-Zee Match pretuned to the positions previously determined and logged when the HW100 was in use. By pretuning the matching unit the instantaneous vswr is always low enough for safety, and the possibility of a serious mismatch (which can occur during tune-up) is avoided. The requirement to tune the antenna or atu is stressed in the manual and repeated in the view of the FT7 by G3KLF (*Rad Com* June 1979, p521). A major attraction of a compact lightweight rig is the opportunity it affords for /M or /P operation, yet the pretuning requirements may act as something of a deterrent.

When a demonstration station was set up using a newly-made G5RV antenna at the author's school, it was not possible to pretune the matching unit, and it was quickly realized that the instantaneous vswr during the tune-up process was unacceptably high. Adjusting for maximum noise on receive was simply not good enough. What was required was a device which allowed the FT7 always to "see" 50Ω while the antenna or atu was being adjusted, however serious the instantaneous mismatch. A little thinking and some thought produced the device shown in Fig 1, which was suggested by [1].

The mode of operation may be understood by dividing the diagram at the dotted line. To the left R1 is a dummy load able to dissipate the output power of the transmitter. It is shunted by everything to the right, made up of R2 and the effective resistance of R3, R4 and R5 together with the unmatched reactance of the antenna or atu. It will be seen that whatever the condition at the output the shunting resistance will always exceed 1,000Ω. A parallel combination of 50Ω and 1,000Ω results in the load "seen" by the transmitter being about 48Ω, which is near enough to 50Ω to be of no consequence.

The matching process itself is monitored by the rf bridge formed by R3, R4, R5 and the output to the atu. Because the three resistors are all 51Ω the bridge is balanced when the atu presents a pure resistance of 51Ω. D1, C1, and the meter form an rf detector to sense the balance point; when the meter reads zero the bridge is balanced. Loading by the meter is reduced by R6, and rf is bypassed by C2 and C3. A sensitivity control was fitted and found to be unnecessary with the FT7, as explained later. Some rough calculations suggested that R2 might need to be reduced to 500Ω and that a diode with low turn-on voltage would be required. Because only a null

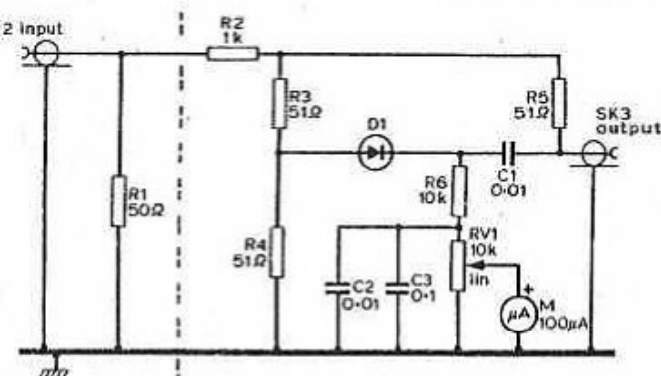


Fig 1. Circuit diagram. The dummy load R1 is fitted to SK1

* Lynton Avenue, Castleton, Rochdale, Lancs OL11 3HW.

RADIO COMMUNICATION

Components list

R1	50Ω dummy load	C1,2	0.01μF ceramic
R2	1,000Ω (see text)	C3	0.1μF ceramic
R3,4,5	51Ω 0.5W 2%	D1	Hot carrier diode
R6	10kΩ	M	100μA (see text)
RV1	10kΩ linear (see text)	SK1,2,3	S0239

reading, not a measurement, is desired, the meter does not have to be very special; a meter of the type to be found in portable cassette recorders will do provided it is no less sensitive than 100μA.

The layout of the bridge should be as symmetrical as possible, and a pcb layout is given (Fig 2). Because the board is symmetrical the input and output sides can be interchanged to suit the particular operator's convenience. Part of the board must be connected to the case by a thick wire, and a short length of desoldering braid is convenient. The "works" fit comfortably into a 15 by 8 by 5cm diecast box obtained from Birketts. This is heavy enough to ensure the unit sits still on the bench, leaving both hands free for tuning up. The board is self-supporting on the input and output wires to the bridge. After wiring up and checking for shorts the unit can be tested.

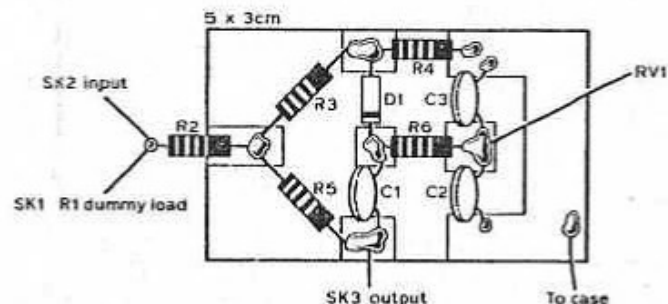


Fig 2. PCB and component layout

With a dummy load fitted to SK1, the input to SK2, SK3 not connected (to ensure maximum mismatch), and RV1 at minimum, power can be applied to the unit via an in-line vswr bridge. If all is well in-line reflected power will be zero. The sensitivity control should be rotated until the meter reads full scale. If fsd cannot be obtained R2 can be reduced but should not be less than 500Ω. In practice it does not matter if the meter reads a little less than full scale, and RV1 can be preset or left out entirely in this case. When the atu is connected the meter reading should fall a little. By adjustment the match can be improved until the reading is zero, and no movement should be perceptible when the transmitter is keyed on and off. Some care is needed to ensure that the reading obtained is zero, as this indicates that the antenna is very well matched. When the antenna or atu is connected to the output of the in-line bridge, the match will be found to be very close to the best obtainable with the atu and antenna in use.

The unit described can be built for about £4. It eliminates the possibility of an unintentional bad mismatch during antenna adjustment and, as a bonus, reduces the annoyance to other band users caused by continuous carrier being radiated during adjustment of the atu. Very little rf reaches the antenna.

Reference

[1] *Solid-state design for the radio amateur*, W. Hayward and D. DeMaw. Published by ARRL. Obtainable from RSGB Publications (Sales).

A Sheet Metal Bender

Reprinted from Zero Beat,

Simple construction and usefulness are combined in this easy to make machine which will bend the softer metals up to 18 gauge and the harder metals up to 24 gauge.

The length of the machine must be determined by the constructor having in mind the largest chassis likely to be required, so plan the size accordingly. The nominal measurements are for 24 inches long overall, giving a bending length of approximately 20 inches.

THE FOUNDATION

The wooden foundation pieces are $1\frac{1}{2}$ inch thick and should be of well seasoned hardwood; the base is 5 inches wide, the hold down 3 inches and the bender $2\frac{1}{2}$ inches wide. Note that the inside edge of the hold down is bevelled to a slope of approximately 80 degrees (the metal edge too) to allow for the natural spring back exerted by metal when bent in length. If the bender is brought tight against the bevel, the metal when relieved of pressure, will spring back to a right angle. The wooden surfaces that come into contact with the metal to be bent are covered with iron, or mild steel, either fully or by 2 inches x $\frac{1}{8}$ inch flat, fixed with counter sunk screws set slightly below the surface. If the strip is used rather than the full plate, then build up the surface flush with the metal by using $\frac{1}{8}$ inch masonite fixed with glue, nails or counter sunk screws.

The hinges must be robust and free from wobble, so obtain a good pair. A slight clearance must be made in the wood to accommodate the knuckle of the hinge. The hinges may well be fitted before the wooden surfaces are covered, as the two edges must bind as closely as possible to ensure a clean bend. This part is probably the most important so exercise care and accuracy in fitting.

THE HOLD DOWN

This rides freely on two $\frac{1}{4}$ inch bolts which are a fixture in the base. Hexagon heads, let in, are ideal. The centres are set about 2 inches in from the front edge and from the side. A steel washer under each wing nut will make tightening easier. Slots are required in the hold down for

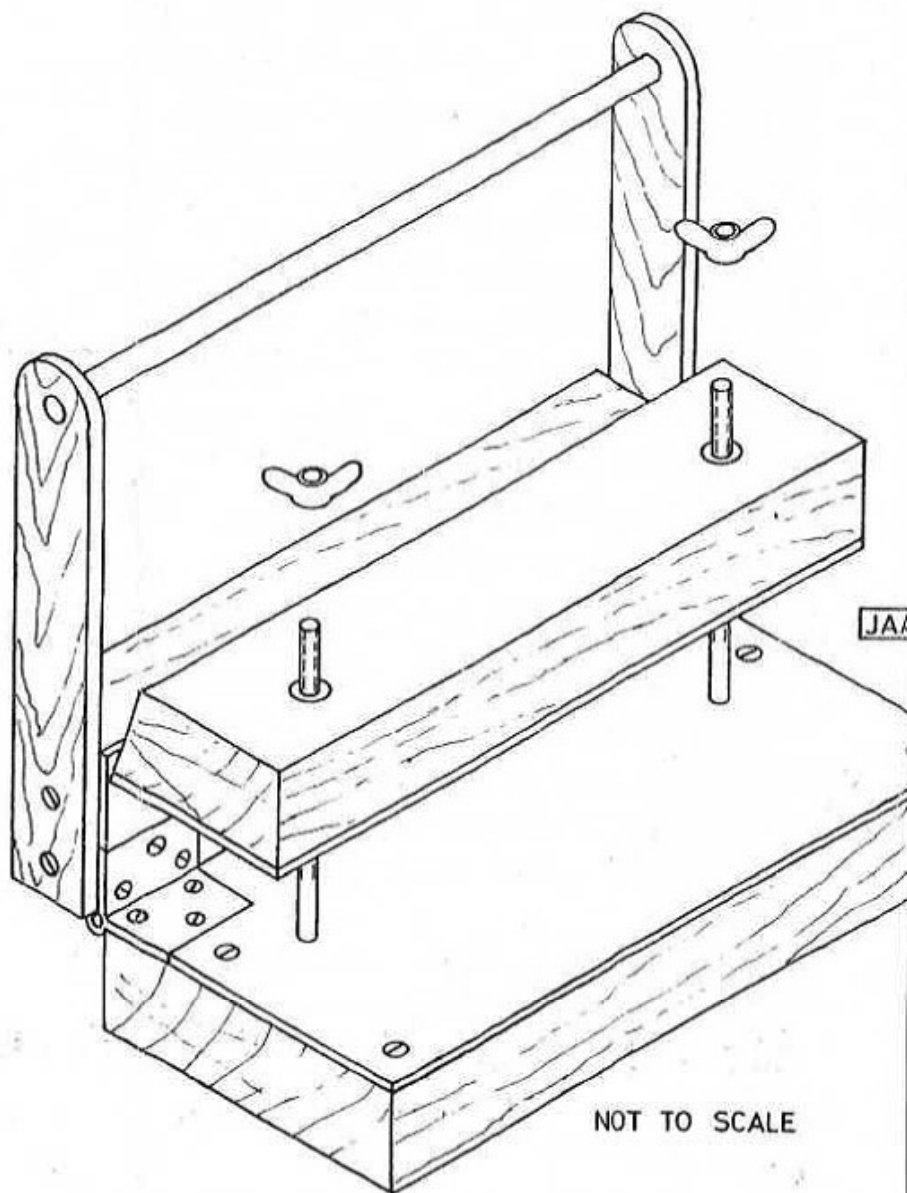
box forming and should be approximately $1\frac{1}{2}$ inch deep. The distances apart are determined by chassis size required and can be put in as required.

Two blades in a hacksaw frame (teeth of each blade opposite to each other) will give sufficient width. The slots are cut into the bevelled edge.

Alternative to cutting slots, a narrow piece of $\frac{1}{8}$ inch mild steel could be used, the slots being cut into the wood with

a wood saw then the metal cut to length, ends squared and fastened, with a gage to correspond with the slots in the wood. (Or a number of different length hold downs could be constructed.)

The bender is lowered to a horizontal position and the work allowed to project over the edge of the base as is desired. The material is then clamped with the hold down and the bender pulled up to vertical position.



There's hallowed ground down the back,
It's known around here as the shack.
In the depth of night as the skip rolls in,
You may see a light, shine from within.
The darling wife sleeps through it all,
The old man's down there, what a ball.

There's wire strung up all around,
There's even some down underground.
There's a rotor and beam up in the sky,
Joined with all these things of wire.

As you know, this guy's a ham,
A breed alone, "WHO GIVES A DAMN".
He hears a call, a rare one too,
He gives a shout, but don't get through.
He pumps more RF out the stick,
This guy comes back, gosh that was quick.

He chats away, heck this is great,
And hears a bash upon the gate.
His neighbours tellies on the blink,
He screams and yells get off that thing.
Like a dog he goes on out,
Just in time to hear him shout.
I'll get the RI on to you.
I can't watch the late show, BOO HOO HOO.

He pats his neighbour on the back,
pours a beer and starts to chat.
The neighbour softens, starts to grin,
A nice cold amber sure fixes him.

He finally gets the neighbour out,
He knows he's won another bout.
He enters back to hard won ground,
His DX is, "NO WHERE FOUND".

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That blasted neighbour should be shot,
to pick out such a bad time slot.
His TV, it is ten years old,
Full of grim, dust and mould.
Has no rejection up the front,
Next time he calls I will be blunt.

That TV sir, it must go,
My kilowatt I'm sure, will make it blow.
So, brace yourself and hold on tight,
Cause I'm down here baby half the night.
My rig is smok'in like a train,
A brick hits the roof, "THAT NEIGHBOUR AGAIN."

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EVERYTHING FROM A TO Z IN ELECTRONICS

86/05 08

THIS IS A TUIT!
AT LONG LAST, WE HAVE
SUFFICIENT QUANTITY FOR
YOU TO HAVE ONE OF YOUR
OWN. GUARD IT WITH YOUR
LIFE! THESE TUITS ARE HARD TO
COME BY — ESPECIALLY THE ROUND
ONES! FOR YEARS YOU'VE BEEN
SAYING "I'LL GET A ROUND TUIT."
NOW THAT YOU HAVE A ROUND TUIT OF
YOUR OWN, MANY THINGS THAT YOU
MEANT TO DO JUST MAY GET DONE!
SO GET TUIT!

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AN IMPROVED 45 WATT TWO METRE BOOSTER AMPLIFIER FOR FM OR SSB

By Roger Harrison VK2ZTB
and Phil Wait VK2ZZQ

This amplifier originally appeared at the Central Coast Amateur Radio Club Convention in February 1976 and was subsequently described by the authors in the April 1976 issue of *ELECTRONICS TODAY INTERNATIONAL*, designated "project 710". Its intended purpose was to amplify the output of the many popular two-metre FM transceivers, which generally have an output power of around 10 watts, to a level of 35-45 watts. The amplifier used the then popular 2N6084 RF power transistor, which was at that time readily obtainable and not expensive. The amplifier featured printed inductors and diode antenna changeover switching. Many people have successfully constructed this amplifier, judging by the number encountered on air.

However, some constructors have experienced difficulties with certain shortcomings of the 2N6084. Their minimum gain is specified as 4.5 dB, which means it will only give 28W output for 10W drive under the specified conditions. Raising the supply voltage and drive power improves matters if a min.-gain transistor is encountered but you don't get something for nothing—efficiency is poor. Some transistors proved to have less than their specified minimum gain. Some transceivers also, proved to have less than their specified output power! The occasionally encountered combination resulted in output powers of less than 20W from the amplifier! This caused gnashing of teeth, tearing of hair and cursing of authors !!\$?*\$! Ducking tomatoes at radio club meetings is not a habit the authors wish to cultivate.

Another problem arose concerning the combined shortcomings of operators and 2N6084's. Although the 2N6084 is assuredly "rugged" according to the data book, and "... resists transistor damage caused by load mismatch", they cannot be treated in a similar manner to valves. Alas, some transistors—and attached bank accounts—have come to grief. It is unwise to apply drive without the power supply connected to the amplifier. Mismatched antennas should likewise be avoided. Some individual transistors "resist" abuse better than others.

Apart from its application with FM transceivers, there were many people desirous of having a linear amplifier, of similar specifications, for use with SSB on two metres. The authors received a number of on-air enquiries as well as a spate of letters on this subject. Attempts to employ

the 2N6084 in linear mode, while moderately successful, showed up a few more limitations of the device. Gain in class B (or AB) proved to be less than its gain in class A. Comment on the linearity would likely be defamatory. It is possible, by selecting devices, to construct a passable linear using the 2N6084 but that may prove expensive at around \$17 per device!

The solution to these irksome problems is found by modifying the circuit to use a CTC transistor, the B40-12. In actual fact, the modifications are quite minor. The circuit, showing the new configuration and changed components, is given in Figure 1. Linear operation is discussed later.

The B40-12 has a minimum specified gain of 5.5 dB at 175 MHz which results in an output of at least 35 watts from 10 watts drive. Its gain at 146 MHz is higher. Experience shows that B40-12's generally exceed their minimum gain specification. They are rated to withstand an infinite VSWR at full drive with 15.5V supply applied. This makes them somewhat more rugged than the 2N6084. Thus, whilst abuse is not encouraged, open or short circuit antennas and operator mishaps, etc., are not likely to be disastrous, or expensive.

THE DIODE SWITCHING CIRCUIT

The original article specified 10 x 1N914 (or 1N916, or BAX13) diodes for the diode changeover switching circuit. Better diodes are the Philips BAV10 and, as they are adequately rated for the powers encountered, only six are required as shown in Figure 1. Take care when tuning up that you don't short either C5 or C7 as this will cause at least one of the diodes to be overloaded and they will go open circuit (pphuttangg!!!).

RFC's

The base choke, RFC2, is changed, now consisting of a miniature RFC (of the un-encapsulated or the moulded variety—whichever) having a value anywhere from 0.15 uH to 0.27 uH with a 4 x 1.5 x 9.5/F8 Neosid suppression bead slipped over the lead from the RFC to the base of the transistor. This "combination", chow mein ... or, base choke ... should be mounted as close to the base as possible—right up at the transistor header.

The collector choke, RFC3, is wound with more turns and is a smaller diameter than that specified for the original circuit.

MISCELLANEOUS COMMENTS

Note that C6, which was a 60 pF trimmer (ELMenco A4004/OX) is now changed to a higher capacity—the 15-115 pF type (ELMenco A4006/OX or similar). Any suitable trimmer having a maximum capacitance greater than this however will be satisfactory.

The component layout is exactly the same as in the original amplifier and the general construction and tune-up details remain pertinent.

PERFORMANCE

With the full 10W drive, using a 12.5-13.5V supply, driving a dummy load or well-matched antenna, at least 35W output should be obtainable. Generally, 40-45W would be more usual, and sometimes as much as 50W or so. More can be obtained, but the maximum collector current and maximum dissipation of the B40-12 should not be exceeded. Better efficiency is also more readily achieved with the B40-12 than with the 2N6084.

SSB OPERATION

A simple diode base circuit, as shown in Figure 2 is quite satisfactory. A 1000 pF feedthrough capacitor or ceramic "button bypass" capacitor is mounted on the PC board adjacent to the grounded end of RFC2 to form a "standoff bypass".

The base choke, RFC2, is then mounted between this and the transistor base. The silicon power diode, two 1/2 W resistors and the trimpot may be mounted in any convenient position. If you wish the diode to be thermally connected to the transistor, in order to provide a measure of thermal tracking, it may be glued to the cap of the B40-12. Use a strong, quick-setting glue such as "Bondza" or "Super Glue". This refinement is not all that necessary though.

The diode switching arrangements as configured will not work with SSB. Two changeover relays, operated from the transceiver Tx/Rx circuitry are recommended. Alternatively, a bias network to provide DC bias switching for diodes could be devised to effect fully solid-state change-over switching.

To set up the amplifier for SSB operation, a suitable power meter, power supply (preferably variable current-limited) and a dummy load should be attached. Insert a current meter in the B40-12 collector supply line. The maximum allowable collector current is 7.0 amps. Observe it.

Set the 470 ohm trimpot to maximum resistance initially. Connect the power supply and adjust the trimpot for about 150-300mA of quiescent collector current.

Next, apply a small amount of drive so that there is some increase in collector current and tune C5, C4 and C6, C7 to obtain a peak in the power output. Further increase drive and again peak C4, C5 and C6, C7. If all is going well, apply full drive and peak the trimmers again for maximum power output. About 30-35W PEP minimum should be obtained with 10W PEP drive.

If desired, linearity may be checked by simultaneously monitoring input and output power and making measurements over a range of power levels. The ratio of output to input should remain almost constant until the point where the amplifier begins to flat-top and output compression occurs. That is, an increase in drive power does not cause a corresponding increase in output power.

If you can arrange to listen to your own signal, so much the better. Some adjustment of the quiescent collector current may be necessary to improve linearity. The values quoted provide a starting point. Individual transistors have different characteristics and the collector current is best adjusted in service for best linearity.

Copies of the original article are obtainable from Electronics Today (at 15 Boundary Street, Rushcutters Bay 2001) for 45c per page. The article commenced on page 86 of the April 1976 issue and continued on pages 87 to 91 inclusive (six pages).

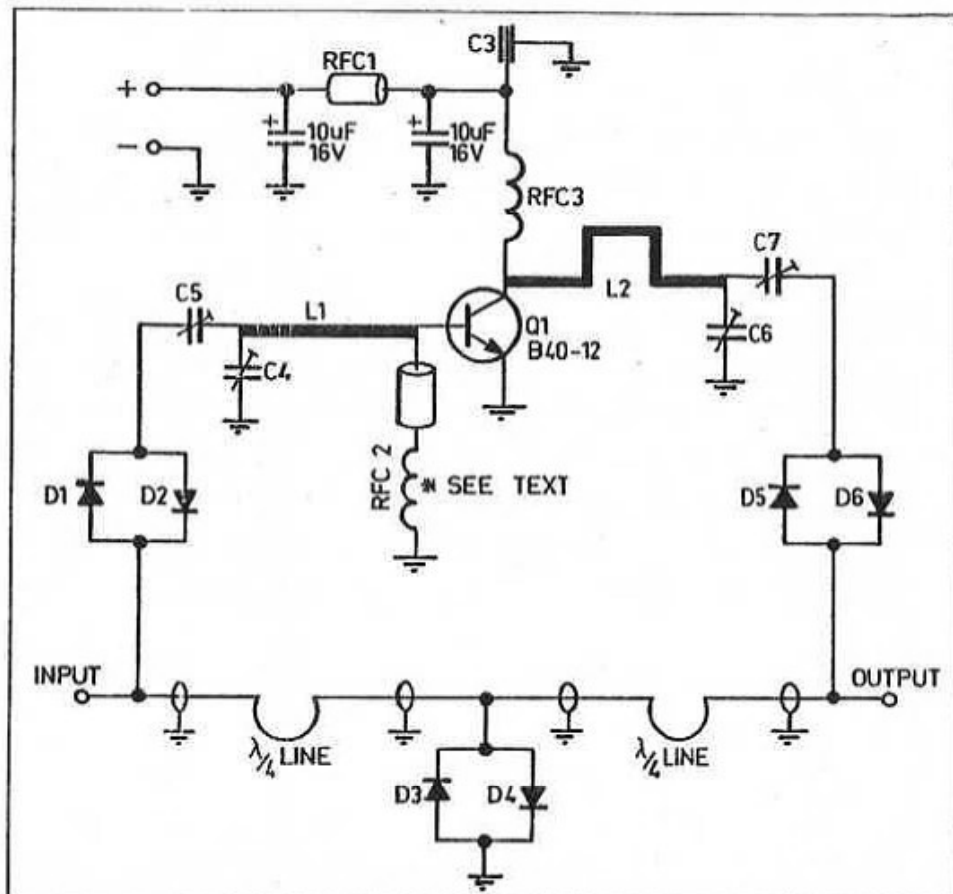


FIG. 1: Modified version of the ETI 710 amplifier employing a B40-12.

6 x BAV10 diodes may be substituted for the 10 x 1N914 or 1N916 diodes specified for the original diode switching circuit.

The 2N6084 is replaced by a CTC B40-12. C6 is replaced by a 15-115 pF Trimmer

(or greater range) such as the ELMENCO A4006/OX.

RFC2 is replaced by a combination choke — a 4 x 1.5 x 9.5/F8 bead is slipped over one lead of a 0.15 to 0.27 uH miniature RFC.

RFC3 is changed to 6 turns, 18 swg tinned or enamelled wire, 5 mm inside diameter, 15 mm long. No resistor in parallel.

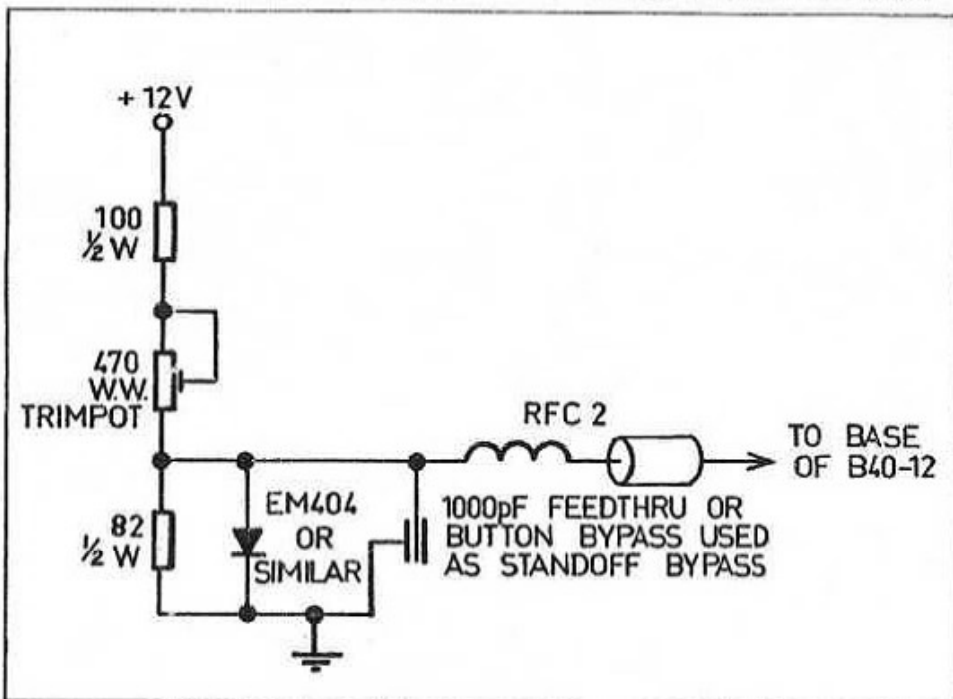


FIG. 2: Suggested Bias Arrangement for SSB Operation.

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CSCAR 10.

Signals from the satellite for some time have been up and down, excuse the pun. Part of the orbit signals are very good but for a short while but spin modulation is severe at times, apart from this some rare DX pops up at odd times. At the moment nothing heard above 32 degs Lat and a fair number of ZS stations come up also.

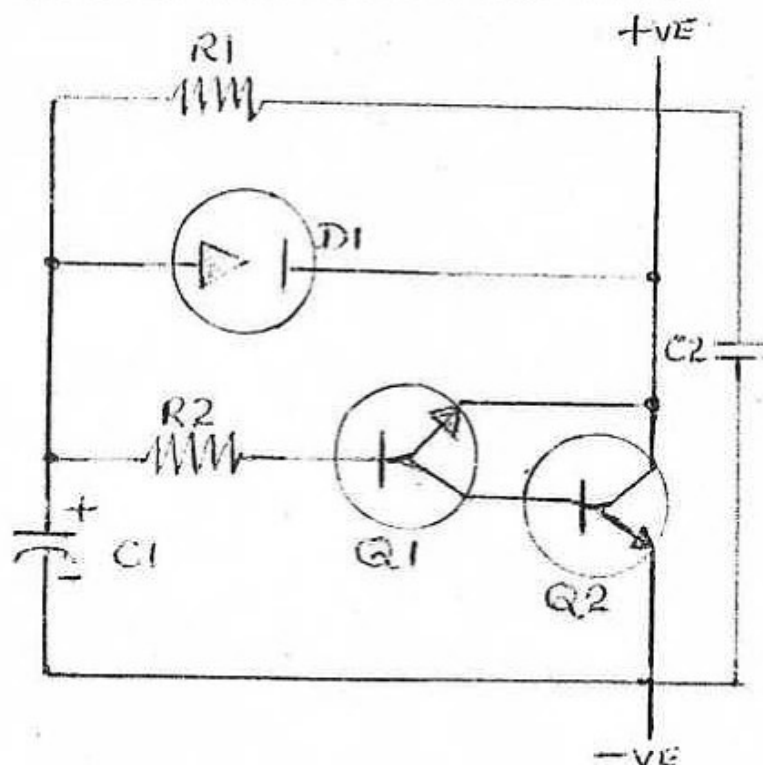
Calls worked to date are. A6, CH, VK6, CT, CX, DJ, DU, EA, EI, F, FC, FK, FO, FR, G, GD, GI, GU, GW, H4, HA, HB, HL, HZ, IT, IS, J3, JA, JD, All USA call districts, KG6, KH6, KH9, KH0, KL7, KX, LU, LA, LX, OE, OH, OK, ON, OX, OY, OX, P2, PA, PY, SM, SP, SU, SV, TF, TL, TU, UA2, UKI, UV, UT, UE2, UE6F, UEg, UE7, All VE call districts, VF, VU, VJ7, ZE, Y2, YB, YC, YU, YV, ZE2, ZL, ZS3, ZS, 4S, 4X, 5Z, 7P, 8C, 9K2, 9H2, 9U, 9V, JY, CH, 3D2, VS, SS, 90 odd countries in all.

My first contact on Oscar 10 was with Andy VK3DTC on 12.3.83.

Kaurie VK3XEX.

Time delay switch for auto (internal light)

Switch is placed across door switch.



R1 = 15K $\frac{1}{2}$ W 5%

R2 = 820Ω $\frac{1}{2}$ W 5%

C1 = 47 Mfd 16V Elec't.

C2 = .47 Mfd.

D1 = EM401

Q1 = 2N3638

Q2 = 2N3055

Delay may adjusted by varying C1.

VARACTOR TUNED BFO

• This is a simple, stable, economical, easy to build varactor tuned BFO (455 kHz. $\pm$ 5 kHz.). It was originally built to help Y.R.C.S. members resolve s.s.b. signals and also receive Morse Code.

This b.f.o. is not affected by hand capacity like most b.f.o.'s and no metal shielding is required. In fact the metal can around the i.f. transformer (i.f.t.) had been removed so that a link coupling coil could be wound around the i.f.t. and connected to a large coil around the short wave set.

Tuning the b.f.o. $\pm$ 5 kHz. is done by a 5K linear pot. (2-100K can be tried out if available) and the voltage change across the transistor in the b.f.o. alters the internal capacity of the base collector junction and this varies the frequency.

B.F.O. CIRCUIT

See Diagram A.

1. Midget transistor type i.f. transformer used—remove metal can first before soldering i.f.t. into circuit.

Put the 5 ohm coil in collector circuit; 1 ohm coil in emitter circuit.

Try reversing connections to either coil (but not both) if the b.f.o. won't oscillate.

Don't use the tap on the 5 ohm winding.

See if there is a condenser built into the base of the i.f.t. If not, put a 330 pF. across the 5 ohm winding (Styro-seal best).

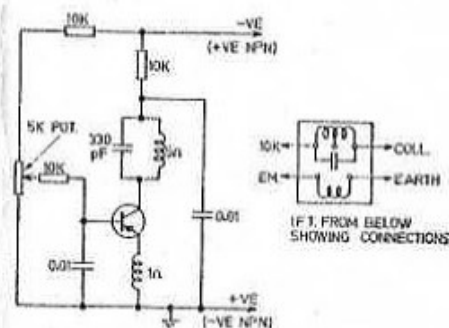


DIAGRAM A

2. Type of transistor—best to use r.f. transistor, although audio transistor will often oscillate.

Collector must be **positive** with NPN transistor; collector must be **negative** with PNP transistor.

3. 5K linear pot (try 2-100K if you have one handy). Wire 10K resistors direct onto the pot so that when pot is turned clockwise the wiper arm goes to 10K resistor and not 9v. (see Diagram B).

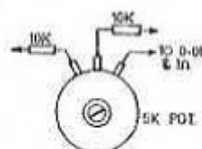


DIAGRAM B

4. Other parts required are:
0.01 μ F. disc condenser (two);
10K resistor (three);
300 pF. Styro-seal if your i.f.t. needs one;
9v. battery;
Veroboard or printed circuit.

LINK COUPLING COIL BETWEEN B.F.O. AND SET

(See Diagram C). Use a piece of thin insulated wire about 4-6 ft. long. Take the middle of the wire and wind two or three turns tightly about the i.f.t. (can removed). Then twist the two leads together and lead out towards the short wave set and make a larger loop to go around the s.w. set or of valve or i.f. transistor or aerial input lead. Solder ends of the wire together so you have a continuous loop.

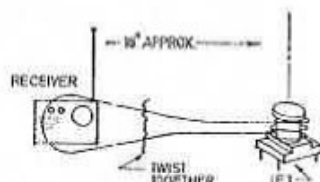


DIAGRAM C

TESTING YOUR B.F.O.

Having built your b.f.o., probably from the complete kit put out by the Y.R.C.S., proceed to measure the resistance across the positive and negative leads (with the battery not connected). It should be several thousand ohms and not a short circuit. Then with a milliammeter in one of the leads connect up the 9v. battery (positive to collector circuit for NPN transistor) and the b.f.o. should draw about 1 milliammeter.

Tough the collector with your finger and if it is oscillating the current should rise slightly.

You could also measure the voltage across the base-emitter junction and if the b.f.o. is oscillating the voltmeter will read backwards.

If you don't have a milliammeter connect up the link coupling coil between i.f.t. or b.f.o. and s.w. set, and listen for a strong signal as you tune between 3AR and 3DB—the b.f.o. will be oscillating on its second harmonic.

GETTING THE B.F.O. ON 455 kHz.

Connect up the link coupling coil between the b.f.o. i.f.t. and broadcast range on set. Set the 5K pot to the middle of its range. Then screw the slug in i.f.t. of the b.f.o. in or out until you get a **very loud** whistle on all stations on broadcast on s.w. bands. This applies only if your set has a 455 i.f. frequency, but this is the frequency most single conversion sets employ—turning the pot to right or left should alter the whistle as you alter the frequency. This should happen on all stations if you are on the i.f. frequency.

Turn pot clockwise from centre positions — this changes 455 to 450KHZ approx., and this is where you resolve your lower side band signals such as 40M and 80M. Turn pot anti-clockwise from centre position — this changes 455 to 460 KHZ approx. and this is where you resolve your upper side band signals such as 20 and 15 M.

The 5K pot varies the base bias which alters the collector current and thus the voltage drop across the resistor in the collector circuit. Thus the voltage across the collector — base junction varies as you rotate the pot and this gives rise to a varactor diode effect which alters B.F.O. frequency. You can mount the pot resistors directly on the pot and this makes the B.F.O. board less crowded.

HOW TO RESOLVE SSB SIGNALS ON YOUR SW SET

In an SSB signal only one side band is transmitted (upper side band in case of 15M and 20M, lower side band in case of 40M and 80M). The carrier is suppressed at the transmitter and the BFO re-inserts the carrier in the receiver but it must be re-inserted carefully in correct relationship to the upper or lower side band being transmitted.

1. First switch off the B.F.O. and tune in the duck talk for the loudest signal (there will be no carrier to tune into, so wait until the operator is talking).
2. Switch on B.F.O. and connect up the link coupling coil. Alter the 5K pot slowly only while operator is talking.
Rotate clockwise for 40 and 80M SSB.
Rotate anti-clockwise for 20 and 15M SSB.
3. The louder the SSB signal the more BFO carrier re-insertion is required — place the large loop close to the set and as a last resort remove the aerial from SW set if the SSB signal is in the next street (this attenuates the SSB signal). The weaker the SSB signal the less B.F.O. injection is needed, so move the larger loop further away from the SW set. If it is too close it will deaden the set (and the weak signal) by its action on the AVC circuit.
4. Mount the B.F.O. in a small plastic box (such as Kodak slide box) and bring out the link coupling loop.
5. Your BFO will also enable you to receive morse code.
6. Kits for this BFO complete with a printed circuit board are available from YRCS (contact VK3AQ) at a most attractive price of \$2.
7. Don't forget to switch off when you have finished.

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WANTED KNOWN

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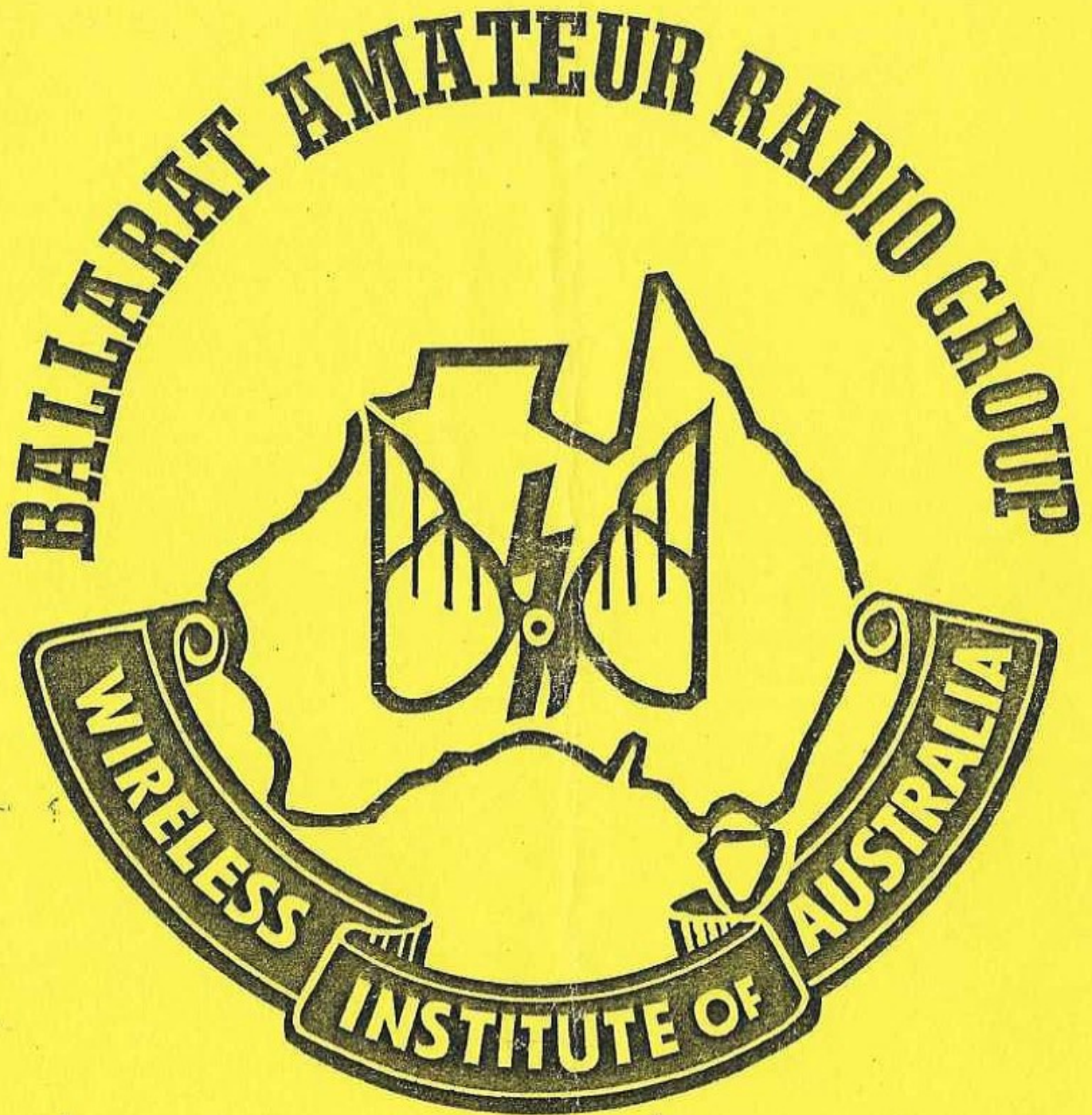
Replies to VK3XOA.

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RON VK3XOA
EDITOR.

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